Robot Free Will

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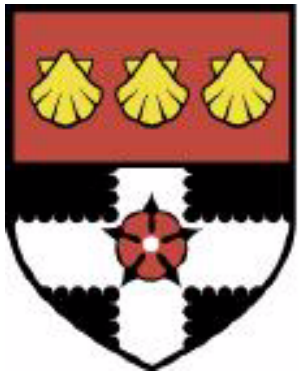
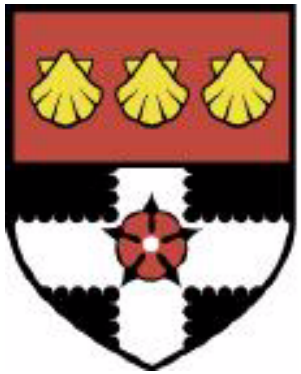


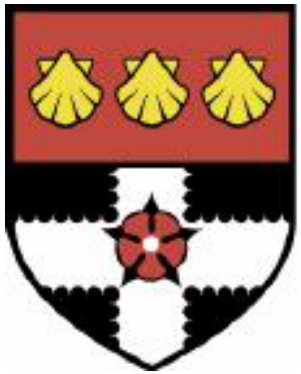
Introduction

- **Perspex Machine**
  - Unifies Turing Machines and Projective Geometry.
  - Describes programs.
  - Describes objects and motions of objects.
  - Describes artificial neural networks.



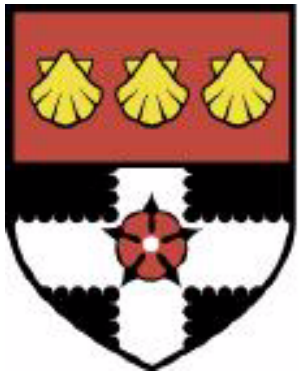
Introduction

- **Free Will**
  - One's-own-will.
  - Symmetry as a structuring element - the route to intentionality?
  - Intentionality.



Introduction

- **Conclusion**
  - One's-own-will can be grounded in perception.
  - Symmetry might boot strap structured perception, cognition, and action.
  - Symmetry might boot strap intentionality.

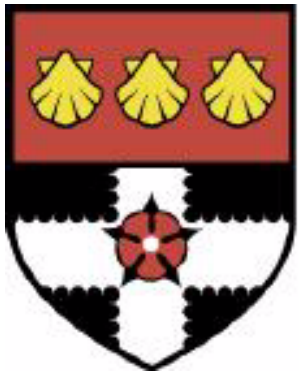


Perspex: Instruction

- Grounded in spacetime as light passing through a pin-hole.
- Supra-Turing because all Turing computations are rational perspexes, whereas the irrational perspexes are perspex computable, but not Turing computable.

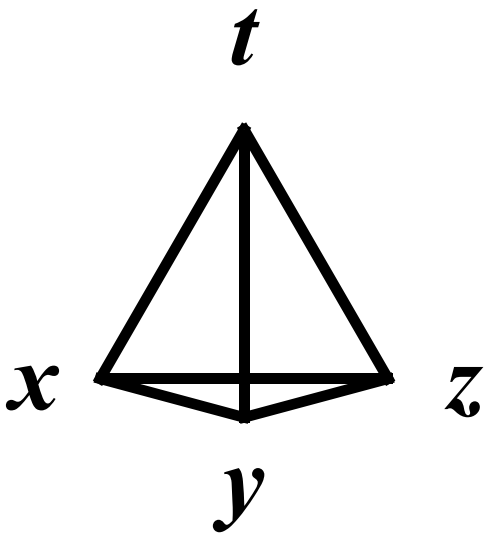
$$\vec{x}\vec{y} \rightarrow \vec{z}$$

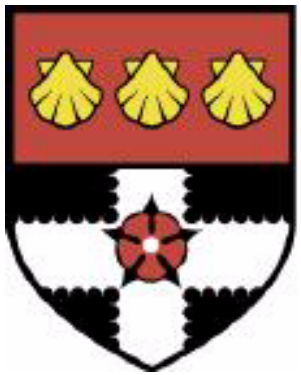
$$\text{jump}(\vec{z}_{11}, t)$$



Perspex: Simplex

- Grounded in the shape of an object in spacetime.
- Can describe the shape of objects by tessellating them.

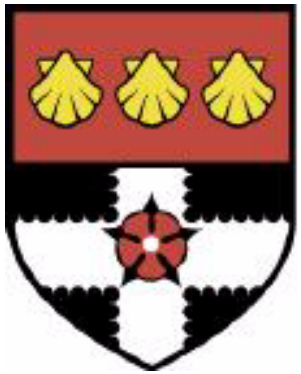




Perspex: Matrix

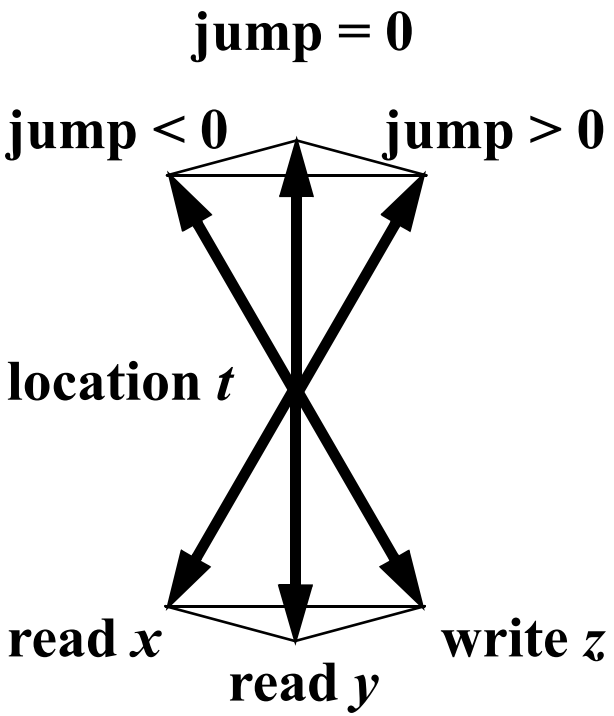
- Grounded in spacetime as light passing through a pin-hole.
- Modelled by a matrix.
- Can describes motions of objects.

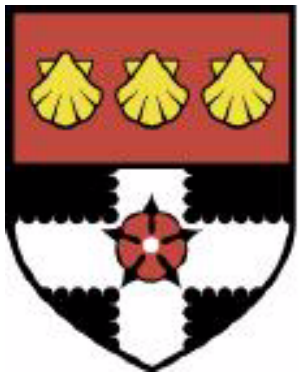
$$\begin{bmatrix} x_1 & y_1 & z_1 & t_1 \\ x_2 & y_2 & z_2 & t_2 \\ x_3 & y_3 & z_3 & t_3 \\ x_4 & y_4 & z_4 & t_4 \end{bmatrix}$$



Perspex: Neuron

- Can model a neuron as cell body at location *t*, plus read- and write-dendrites, plus jump dendrites.

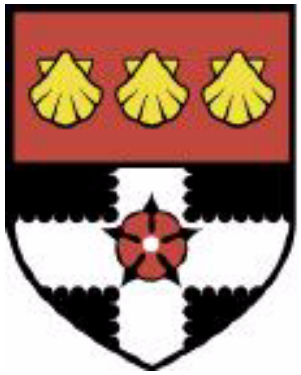




Symmetry

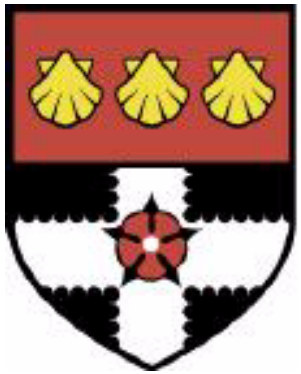
- Finding symmetry in perceived objects and perceived motions allows the perception to be encoded efficiently. This has survival value for a robot and is analogous to a tissue-need.

- Is a plan to satisfy a tissue need a basic intention?



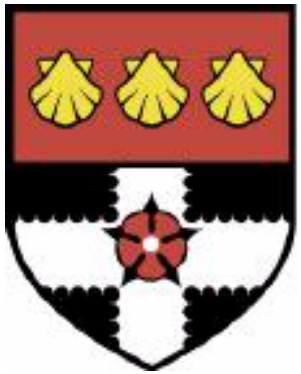
Symmetry

- Perspex perceptions can be executed as programs, thereby boot strapping more-structured perceptions.
- Finding symmetry in programs finds subroutines.
- Is the selection of which subroutines to execute an example of intentionality?



Symmetry

- Does acting so as to bring about symmetry between an imagined world and the real world constitute intentionality?

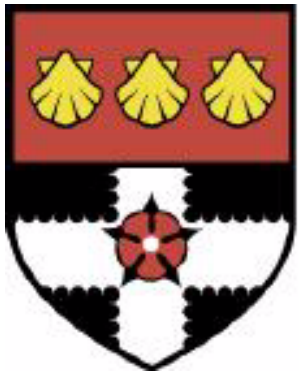


Action

- An *action* is the whole of a perspex instruction.
- What more do you want of "action"?

$$\vec{x}\vec{y} \rightarrow \vec{z}$$

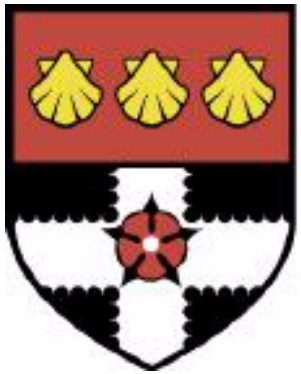
$$\text{jump}(\vec{z}_{11}, t)$$



Selection

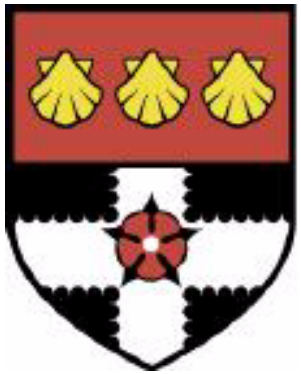
- A *selection* is the conditional part of the perspex instruction.
- What more do you want of "selection"?

$$\text{jump}(\vec{z}_{11}, t)$$



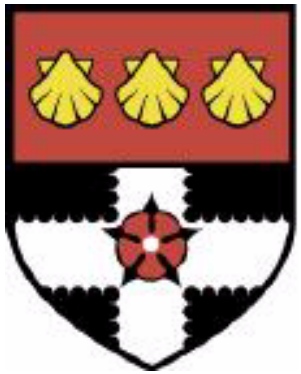
Will

- X *wills* Y when X is conscious of its selection Y.
- What more do you want of "will"?



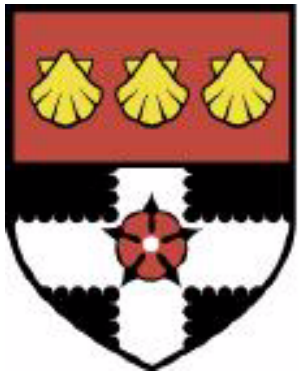
Visual Consciousness

- *Consciousness* comes in many modalities, for example, the sensory modality of visual consciousness.
- X is *visually conscious* of Y when X can see Y.
- What more do you want of "visual consciousness"?



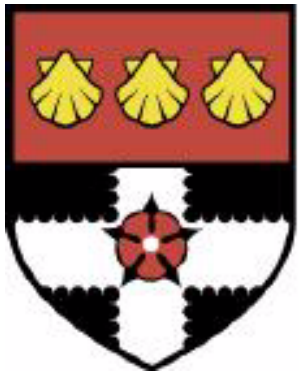
See

- X can *see* Y when X has a partial, bidirectional mapping between an algorithm and an image of Y.
- An *algorithm* is a perspex program.
- An *image* is a perspex field.
- What more do you want of "seeing"?



One's Own Will

- X expresses *its own will* when X wills Z and X selects Z to be a program from an unencoded source.
- Is one's-own-will necessary to free will?
- Is intentionality necessary to free will?
- What more do you want of "free will"?



Conclusion

- One's-own-will can be grounded in perception.
- Can symmetry boot strap structured perception, cognition, and action?
- Can symmetry boot strap intentionality?
- Can a robot obtain free will by applying symmetry to perspexes that describe objects, motions, programs, and artificial neural nets?